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EPA Evaluation of the Fuel Conservation Device

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EPA Evaluation of the "Fuel Conservation Device"

By

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February 1980

Test and Evaluation Branch
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Office of Mobile Source Air Pollution Control
U.S. Environmental Protection Agency

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16. ABSTRACT

On June 21, 1979 the EPA received a request from FDC Electronics, Inc. for evaluation of a fuel saving device termed the "Fuel Conservation Device." This document announces the conclusions of the EPA's evaluation under section the provisions of Section 511 of the Motor Vehicle Information and Cost Savings Act.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Fuel Consumption Automobiles	Fuel Economy Fuel Saving Device	

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[40 CFR Part 610]

[FRL _____]

FUEL ECONOMY RETROFIT DEVICES

Announcement of Fuel Economy Retrofit Device Evaluation for "Fuel Conservation Device"

AGENCY: Environmental Protection Agency (EPA).

ACTION: Notice of Fuel Economy Retrofit Device Evaluation.

SUMMARY: This document announces the conclusions of the EPA evaluation of the "Fuel Conservation Device" under the provisions of Section 511 of the Motor Vehicle Information and Cost Savings Act.

FOR FURTHER INFORMATION CONTACT: F. Peter Hutchins, Emission Control Technology Division, Office of Mobile Source Air Pollution Control, Environmental Protection Agency, 2565 Plymouth Road, Ann Arbor, Michigan 48105, 313-668-4340.

BACKGROUND INFORMATION: Section 511(b)(1) and Section 511(c) of the Motor Vehicle Information and Cost Savings Act (15 U.S.C. 2011(b)) requires that:

> (b)(1) "Upon application of any manufacturer of a retrofit device (or prototype thereof), upon the request of the Federal Trade Commission pursuant to subsection (a), or upon his own motion, the EPA Administrator shall evaluate, in accordance with rules prescribed under subsection (d), any retrofit device to determine whether the retorfit device increases fuel economy and to determine whether the representations (if any) made with respect to such retrofit devices are accurate."
>
> (c) "The EPA Administrator shall publish in the the Federal Register a summary of the results of all tests conducted under this section, together with the EPA Administrator's conclusions as to -
>
> (1) the effect of any retrofit device on fuel economy;
>
> (2) the effect of any such device on emissions of air pollutants; and
>
> (3) any other information which the Administrator determines to be relevant in evaluating such device."

EPA published final regulations establishing procedures for conducting fuel economy retrofit device evaluations on March 23, 1979 [44 FR 17946].

ORIGIN OF REQUEST FOR EVALUATION: On June 21, 1979 the EPA received a request from FCD Electronics, Inc. for evaluation of a fuel saving device termed the "Fuel Conservation Device" (FCD). An evaluation has been made and the results are described completely in a report entitled: EPA Evaluation of "Fuel Conservation Device" Under Section 511 of the Motor Vehicle Information and Cost Savings Act. Copies of this report are available upon request.

SUMMARY OF EVALUATION: The "Fuel Conservation Device" is designed to shut off a vehicle engine which is negligently left idling. The application for evaluation neither demonstrates a need for the device nor quantifies the fuel savings which might occur. It cannot be concluded that, if such a need exists, a device such as the "Fuel Conservation Device" is the solution. No overall conclusion as to the fuel economy impact of the "Fuel Conservation Device" is possible. Therefore, claims of "enormous fuel savings," "saving a tremendous amount of fuel," "astronomical ... amount of fuel can be saved," cannot be substantiated by the data submitted with the application. Further testing and documentation is needed before fuel savings claims, if any, can be substantiated.

Date

David G. Hawkins
Assistant Administrator
for Air, Noise, and Radiation

EPA Evaluation of "Fuel Conservation Device"
Under Section 511 of the Motor Vehicle Information and Cost Savings Act

The following is a summary of the information on the device as supplied by the applicant and the resulting EPA analysis and conclusions.

1. Marketing Identification of the Device: Fuel Conservation Device or FCD.

2. Inventor of the Device and Patents: Applicant states that the patent has been assigned to FCD Electronics, Incorporated, North Dallas Bank Tower, 12900 Preston Road, Suite 500, Dallas, Texas 75230. Patent Application Serial Number - 32764. No patent number was supplied.

3. Manufacturer of the Device:

   FCD Electronics, Inc.
   North Dallas Bank Tower
   12900 Preston Road, Suite 500
   Dallas, Texas 75230

4. Manufacturing Organizations Principals:

   Board of Directors

   Melvin F. Swain
   James F. Mall
   Gerald D. Bostic, Vice President and Secretary
   Robert E. Neves, Jr., President and Treasurer

5. Marketing Organization in U.S. Making Application:

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   Dallas, Texas 75230

6. Identity of Applicant: FCD Electronics, Inc.

7. Description of the Device: (As supplied by the applicant): "The FCD is primarily designed to shut down an engine when it is not being used. There are four primary ways the devices do this:

1. By monitoring a (vehicle) door.
2. By monitoring the emergency brake.
3. By monitoring the "park" position in an automatic transmission.
4. By combining any two of the three above and setting one to override the other.

Each monitoring system can be a positive shut off or override reset system. For example: Door Actuated Device:

a. Positive shut off: Open the vehicle door. After a preset time, the device will shut off the engine.

b. Override reset system: Open and shut vehicle door. This action starts the engine shut-off timer. If the door is opened and closed again before shut-off is actuated, then the system will reset and the engine will not shut-off."

The FCD devices are small, solid-state component units, installed on the firewall. A further description is given in Attachment A.

8. Claimed Applicability of the Device: "This device/s can be installed in and used by any/all vehicles using gasoline or diesel powered engines."

9. Device Installation; Tools Required, Expertise Required (claimed): "At this time intallation of any/all FCD Devices is/are being done by our (FCD Electronics, Inc.) staff or supervised by our (FCD Electronics, Inc.) personnel. However, in the future, any device that will not be installed or supervised by our (FCD Electronics, Inc.) personnel will have specific installation instructions per specific unit model per specific vehicles. Tools: a drill, one small standard screwdriver, one side cutters, one hand crimp. Instructions: Two holes are driven into fire wall - mount device to fire wall. Color coded wires come out of the device through a small wire harness. a) In a gasoline engine powered vehicle, the blue wire attaches to the coil; white wire to ignition switch; red to the actuation switch, and black is ground. b) In a diesel engine powered vehicle, the blue wire to the fuel solenoid, white wire to the ignition switch, red wire to the actuation switch, black to ground, two additional yellow wires attach to the air brake switch."

10. Device Maintenance (claimed):

Not applicable.

11. Effects on Vehicle Emission (non-regulated) (claimed): "The device has no effect on emissions."

12. Safety of the Device (claimed): "If unit malfunctions (field testing shows the unit to be 'fail-safe') engine will not be shut down via this device. In other words, the vehicle will revert to operating as it did prior to installation of the device."

13. Test Results - Regulated Emissions and Fuel Economy: "The device has no effect on emissions. Not Applicable."

14. Information Gathered by EPA: None.

15. Analysis: The installation of the FCD appears to be more complicated than described in the application. If installation is performed by FCD personnel there should be no problems. The ordinary consumer would need more specific details which FCD electronics says will be provided.

    The lack of required maintenance appears to be correct.

    There may be safety related problems with the FCD beyond just failure of the device to shut off the engine. Engine shut off at unexpected times could result in vehicle accidents. Proper installation, calibration, and operator familiarization would be required.

    The device should not have any significant effect on regulated or unregulated exhaust emissions.

16. Conclusions: This device falls into the category of operation, not vehicle, modification. If there is a problem of vehicle operators leaving vehicles running at idle, this problem could be dealt with by 1) modifying the operator's vehicle usage habits or 2) preventing him from wasting fuel with a device such as the FCD. There is no data supplied by the applicant or uncovered by EPA which quantifies the amount of fuel wasted through negligently leaving engines idling. Such data is needed before evaluation of the feasibility of the FCD device can be made. A large fleet of properly instrumented vehicles would have to be run with and without the FCD device to determine the amount of negligent idle time that would be saved. Fuel consumption records for the fleets would quantify fuel savings due to the FCD and the demonstration should also identify any potential safety problems associated with such an engine cut-off device. The drivers in the test program should not be aware of the test variables or their driving habits might be altered. There may be a need for such a device in some commercial vehicle fleets. The application does not demonstrate either a need

or quantify the fuel savings which may occur. On the basis of the information provided, it cannot be concluded that if such a need exists, that a device such as the FCD is the solution. No overall conclusions as to the fuel economy impact of the Fuel Conservation Device are possible. Therefore, the claims of "enormous fuel savings", "saving a tremendous amount of fuel", "astronomical ... amount of fuel that can be saved", cannot be substantiated by the data submitted in the application. Further testing and documentation is needed before fuel savings, if any, can be quantified.

Attachments

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Attachments

Description

Automatic Turnoff Apparatus for Motor Vehicles

Technical Field

The present invention relates generally to fuel conservation devices for motor vehicles and, in one of its aspects, to an apparatus for automatically turning the motor of a motor vehicle off when the motor power is not required.

The nature of the use of many commercial motor vehicles requires frequent stops at which the operator leaves the operating station for the purpose of loading or unloading merchandise. Milk trucks would be a common example of such a motor vehicle use. Other vehicles, such as diesel trucks, are left running for long periods of time while not in use. In the case of diesel trucks, the diesel motors should not be turned off until the temperature of the motor has dropped below a certain value. Truck drivers, in order to make best use of their own time, frequently leave their trucks running while they make stops such as meal stops rather than waiting for the motors to cool and then turning them off.

Background Art

The inventor is not aware of any pertinent background art.

Disclosure of Invention

The present invention is an apparatus for use in a motor vehicle, intended primarily for commercial vehicles. The apparatus monitors certain component elements of a predetermined condition affecting the motor vehicle, and based upon a determination that the predetermined condition exists, turns the motor off after a predetermined time interval.

An apparatus according to the present invention includes at least one sensor for detecting the existence of component elements of a predetermined condition, a means responsive to the at least one sensor for determining the existence of the predetermined condition and generating a unique signal when the predetermined condition is determined to exist, a timer responsive to the means for generating a signal, and a means responsive to the timer for turning the motor off. The timer begins timing when the unique signal representing the existence of the predetermined condition is generated. The means responsive to the timer for turning the motor off, turns the motor off when the timer has measured a predetermined time interval. Normally one sensor is used for detecting the existence of each component element of the predetermined condition. A preferred form of the present invention includes a means responsive to a preselected sensor for resetting the timer after timing has begun when that sensor fails to detect its component element of the predetermined condition. This allows preventing the motor from being turned off if one of the component elements returns to normal. Such a means, of course, can exist for any number of sensors.

One embodiment of the present invention includes a door sensor for detecting the existence of an open door of the vehicle, and an emergency brake sensor for detecting the existence of an applied emergency brake. The signal generating means generates the unique signal only when the door sensor detects an open door and the emergency sensor detects an applied emergency brake at the same time. The two conditions are logically anded. Alternatively, for a motor vehicle with an automatic transmission, a parking gear sensor for detecting the existence of an engaged parking gear can be used in place of the emergency brake sensor. Such an arrangement works well to save fuel on delivery motor

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vehicles where there are frequent stops, and often the driver does not turn the motor off at the stops. The door being open and a parking gear engaged or an applied emergency brake are component elements of a stop condition. The means responsive to the timer for turning the motor off can be made to operate after a reasonable time interval to ensure that there is a real delivery stop, and not just a brief stop such as to refasten a seat belt. Thirty seconds might be a reasonable predetermined time interval for such vehicles. In such an arrangement, the door sensor is the preselected sensor for resetting the timer after the timing has begun. Thus, when the door sensor fails to detect an open door, an open door being a component element of the predetermined stop condition, the timer is reset, which in a preferred arrangement is held in reset as long as the door remains closed.

Frequently a driver will sit in his vehicle and "rev" the motor for motor warmup or other purposes. Since it is undesirable to turn the motor off automatically under such circumstances, an arrangement of the present invention to take care of such circumstances includes a revolution rate sensor for detecting the revolution rate of the motor. The signal generating means includes a means responsive to the revolution rate sensor for determining the existence of a revolution rate below a predetermined value, and the generating means generates the unique signal indicating the existence of the predetermined condition only when the revolution rate is below the predetermined value.

An arrangement of the present invention especially suited for diesel trucks includes a motor temperature sensor for detecting the temperature of the motor. The signal generating means includes means responsive to the motor temperature sensor for determining the existence of a temperature below a predetermined value, the temperature value below which the motor can be turned off without damage. The generating means

generates the unique signal representing the existence of the predetermined condition only when the temperature is below the predetermined value.

In a preferred embodiment of the invention, the generating means, the timer, and the means for turning the motor off are all packaged together, preferably on a common circuit board, with connectorized connections for the sensors as well as for power, ground, and the connections for turning the motor off.

A preferred form of the means for turning the motor off includes a relay. The contacts of the relay are connected in series between the battery and the ignition switch of the motor vehicle, and the coil of the relay is responsive to the timer. The contacts are normally closed, but open when the timer has measured the predetermined time interval, thus breaking the series circuit between the battery and the ignition switch and turning the motor off.

These and other objects, advantages and features of this invention will be apparent from the following description taken with reference to the accompanying drawings, wherein is shown the preferred embodiments of the invention.

Brief Description of Drawings

Figure 1 is a block diagram of an apparatus according to the present invention for turning off a motor vehicle; and

Figure 2 is a schematic representation of the apparatus of Figure 1.

Best Mode for Carrying Out the Invention

An apparatus according to the present invention for use in a motor vehicle is referred to generally by reference numeral 10. Apparatus 10 includes at least one sensor, in this case a plurality of sensors 12, 14, 16, 18 and 20. Each sensor is for detecting the existence of a component element of a predetermined

condition. Door sensor 12 is for detecting the existence of an open door of the motor vehicle. Emergency brake sensor 14 is for detecting the existence of an applied emergency brake. Parking gear sensor 16 is for detecting the existence of an engaged parking gear. Normally, either parking gear sensor 16 or emergency brake sensor 14 is not used since the parking gear sensor is only needed for motor vehicles with automatic transmissions, and the emergency brake is normally only used for vehicles with standard transmissions. Revolution rate sensor 18 is for detecting the revolution rate of the motor, and motor temperature sensor 20 is for detecting the temperature of the motor.

Apparatus 10 also includes a means 22 responsive to the at least one sensor, in this case responsive to all of the connected sensors through leads 13, 15, 17, 19 and 21 respectively, for determining the existence of the predetermined condition and generating a unique signal when the predetermined condition is determined to exist. A timer 24 is responsive through lead 23 to means 22 for generating a signal. Timer 24 begins timing when the unique signal representing the existence of the predetermined condition is generated onto lead 23. A means 26 is responsive through lead 25 to timer 24 for turning motor 28 off when timer 24 has measured a predetermined time interval. When emergency brake detector 14 is used, signal generating means 22 generates the unique signal only when door sensor 12 detects an open door and emergency brake sensor 14 detects an applied emergency brake. Otherwise, in motor vehicles with automatic transmissions, signal generating means generates the unique signal only when door sensor 12 detects an open door and parking gear sensor 16 detects an engaged parking gear.

Referring now to Figure 2, signal generating means 22 includes a means 30 responsive to revolution rate sensor 18 for determining the existence of a revolution

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rate in motor 28 below a predetermined value. Generating means 22 generates the unique signal signifying the existence of the predetermined condition only when the revolution rate is below the predetermined value. One form of revolution rate sensor 18 is the type sensor that can be installed between the distributor and the coil, and which generates a dc voltage proportional to the revolution rate of the motor. Means 30 for determining the existence of a revolution rate below a predetermined value includes an amplifier such as operational amplifier 32 for amplifying the signal received along lead 19 from revolution rate sensor 18, and a comparator 34 to compare the output of operational amplifier 32 with a reference voltage V_{ref} tapped off a variable resistor 36. Diode 38 prevents comparator 34 from drawing current back through its output when its output is low.

Motor temperature sensor 20 is also an analog device. Motor temperature sensor 20 can be plugged into conectors 40 in place of revolution rate sensor 18. In such a case, means 30 becomes a means responsive to motor temperature sensor 20 for determining the existence of a temperature below a predetermined value. The signals from the various sensors are logically anded by means of and gates 42 and 44 and tied-and connection 46. Pull-up resistors 48 connect the and gate inputs for switch-type sensors to the electrical power 50 for the vehicle, typically a battery. Switch-type sensors, in this case door sensor 12, emergency brake sensor 14, and parking gear sensor 16, are normally closed so that an open circuit in one of the lines or removal of one of the sensors, such as removing parking gear sensor 16 when the apparatus is used in a motor vehicle with a standard transmission, causes a high at the and gate input, indicating the same as the existence of the component of the predetermined condition that was to be sensed.

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Timer 24 includes a timer chip 52 such as the common 556 timer which includes two timing circuits. The value of capacitor C1 and resistor R1 determine the time interval measured by the first timing circuit, and the values of capacitor C2 and resistor R2 determine the time interval for the second timing circuit. Coupling capacitor C_{C2} couples the output of the first timing circuit into the input of the second timing circuit so that the two timing circuits operate in serial. Capacitor C_f and resistors RV1 and R3 provide the necessary biasing for timer chip 52. The unigue signal generated by signal generating means 22 to represent the determination that the predetermined condition exists is a logic level zero. The transition from a logic level one to a logic level zero is coupled through coupling capacitor C_{C1} as a negative going pulse or spike which initiates the first timing circuit. When the first timing circuit has measured its time interval, it transmits a similar negative going pulse or spike through coupling capacitor C_{C2} to the second timing circuit which in turn is initiated.

The second timing circuit can be reset by making lead 54 logically zero. The second timing circuit is held at reset by holding lead 54 at zero. For instance, if door sensor 12 has detected the presence of an open door and emergency brake sensor 14 has detected the existence of an applied emergency brake, then the timing sequence would be initiated, but before the predetermined time interval has elapsed, the door is again closed so that door sensor 12 also closes, then the timer would be reset. The second timing circuit is chosen for the reset since the two timing circuits act serially, and it might be possible to have closed the door after the first timing circuit had already initiated the second timing circuit. By holding the reset, there is no possibility of resetting and removing the reset prior to the time the second timing circuit is initiated, but after the first timing

circuit is initiated. Tying lead 54 to lead 13 and the second timing circuit reset creates a means responsive to the preselected sensor for resetting timer 24 after timing has begun when that preselected sensor fails to detect a component element of the predetermined condition.

Means 26 for turning motor 28 off includes a relay 56. Contacts 58 and 60 are for connecting electrically in series between battery, power 50, through distributor primary tap 62 and ignition switch 64 of ignition system 66 through resistance wire 68. Coil 70 of relay 56 is responsive to timer 24 through gate 72. Contacts 58 and 60 are normally closed, opening when timer 24 has measured the predetermined time interval. When the contacts open, they open the circuit between the ignition switch and the distributor, turning off motor 28.

Capacitors C_3 amd C_4 are for filtering the voltage from power 50. Diode D1 prevents overloading coil 70.

From the foregoing it will be seen that this invention is one well adapted to attain all of the ends and objects hereinabove set forth, together with other advantages which are obvious and which are inherent to the apparatus. It will be understood that certain features and subcombinations are of utility and may be employed without reference to other features and subcombinations. This is contemplated by and is within the scope of the claims.

As many possible embodiments may be made of the invention without departing from the scope thereof, it is to be understood that all matter herein set forth or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

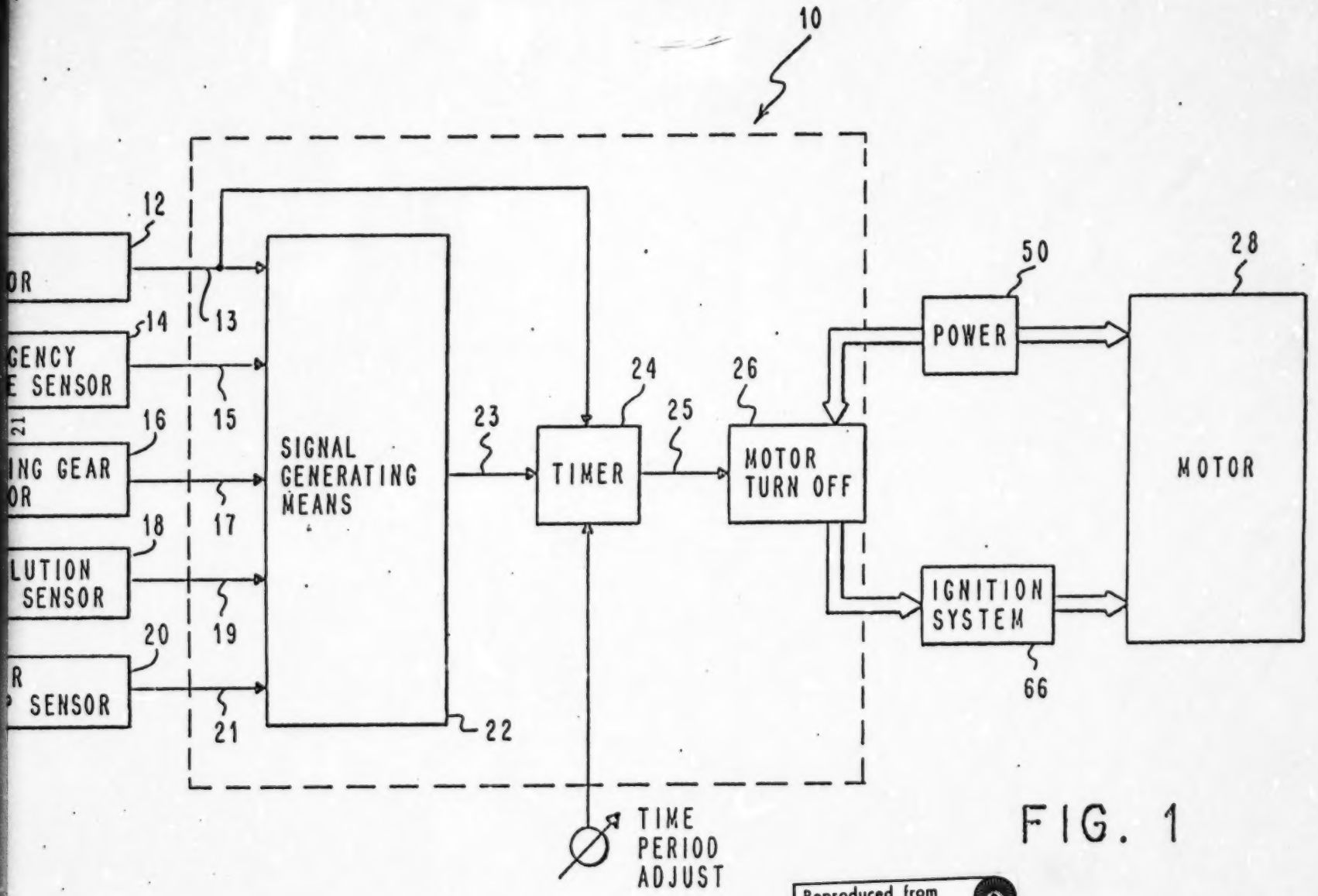

FIG. 1

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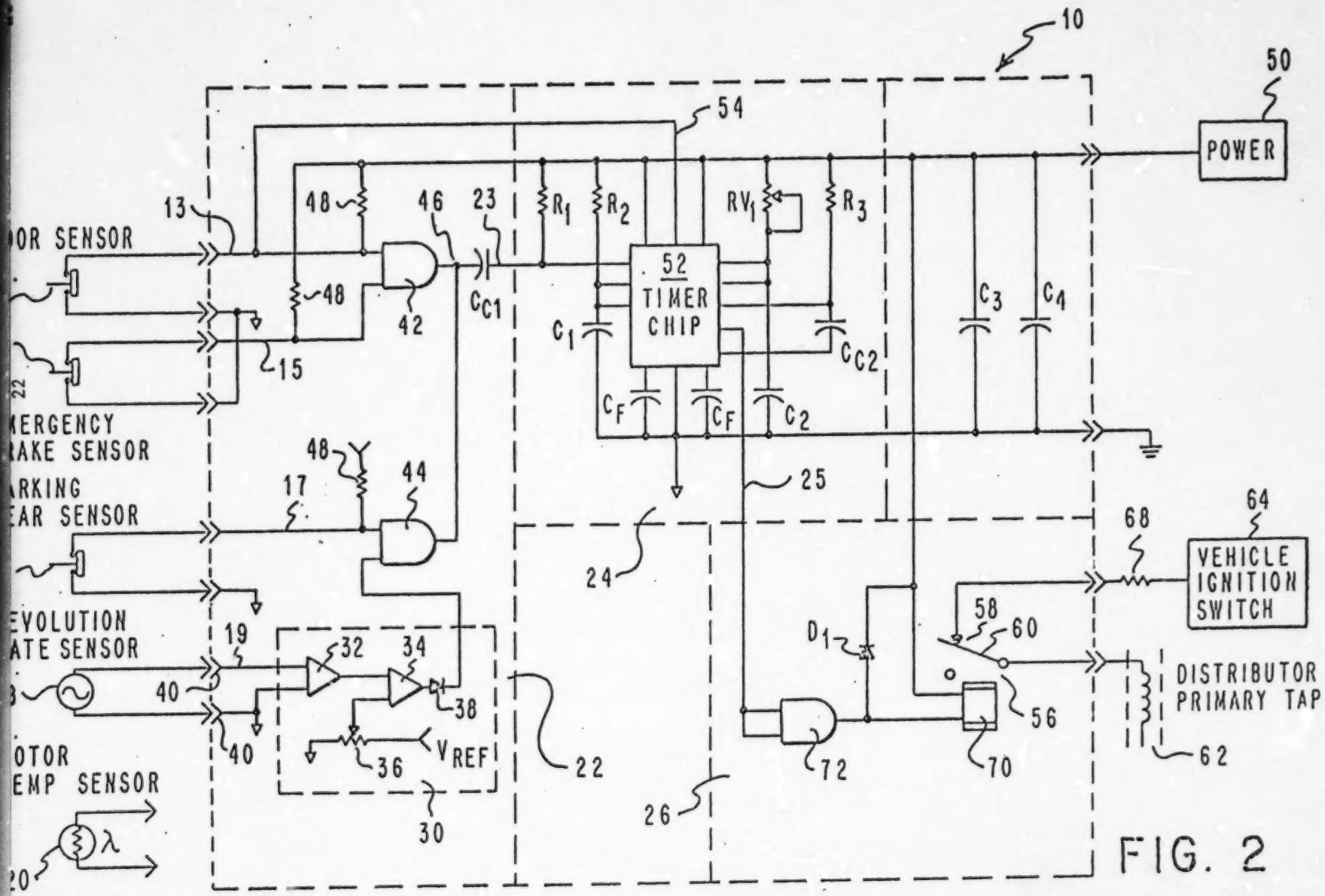
10
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POWER
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R_1
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OR SENSOR
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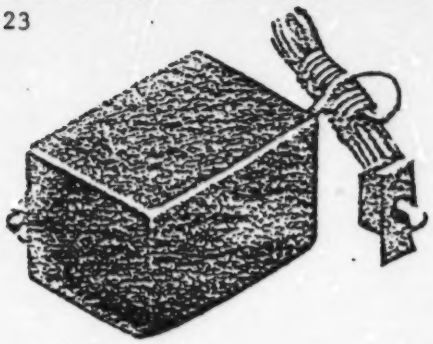
FIG. 2

FCD™
electronics incorporated



Fuel **C**onservation **D**evices™ are products of FCD Electronics, Incorporated and are primarily designed to reduce fuel consumption and conserve fuel as well as reduce/conserve oil consumption and engine wear by shutting-off engine operation during periods in which engine power is not required.

Fuel **C**onservation **D**evices™ operate by monitoring certain vehicle operator actions and based on these actions initiate engine shutdown after a predetermined and preset time period.

The operating power for the device is derived from the electrical system of the vehicle in which it is installed. Other device cables connect to the vehicle's ignition system and also to sensors which provide decisional data.

The FCD unit will shutdown or cease operation of the engine in accordance with information from the sensors which result from operator actions. The period of time from receipt of sensor information to engine shutdown may be preselected and preset. This time period selection allows the unit to be tailored to the specific vehicle or operational needs.

FCD units are composed of solid-state, integrated electronic circuits and discrete electronic and mechanical components housed in an environmental enclosure. They are small, compact, easily installed and maintenance free. They are guaranteed against defects in materials and workmanship — are tamper proof and are custom assembled to your specific requirements.

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MANAGEMENT AND FUEL CONSERVATION DEVICES™

Today, more than ever before, every gallon of gasoline and every quart of oil you, as management, can save, means larger cost of production savings, thus, greater profits for your company. As fuel cost problems get worse — and all indications are that they will — the more fuel you can save today, the more fuel you'll have to save tomorrow!

If you are responsible for fuel and oil allocation/use for the vehicles in your company, more attention is being focused your way. Drivers/operators of your company's vehicles are not responsible for the purchase of fuel or how it's used in their vehicles — **YOU ARE!** Drivers/operators don't have to worry about leaving their engines idling — **YOU DO!!** Now you'll KNOW the engine in each vehicle will be off because the operator CAN'T leave it on. **HE CAN'T DEFEAT IT!**

You as a Manager ....

1) .... can be sure your vehicles are being operated in accordance with the fuel conservation policies you have set.
2) .... now control the operation of that vehicle at all times.
3) .... are responsible for fuel allocation. You NOW have control of when the engines are on and when they're off.
4) .... now determine whether the engine in that vehicle is running or not while the delivery man/service operator/driver is on the road. You do that by setting this device for a time that YOU feel is going to save each vehicle the most gas, oil and engine wear. But essentially what you're doing is saying, "Hey, I don't have to worry about that guy leaving that vehicle's engine on all day long. He's not going to be able to do that if I put this FCD device on." The drivers won't like it, but YOU are charged with reducing fuel costs to the company and this device DOES JUST THAT!

FCD Electronics, Incorporated can monitor each vehicle any way you wish and insure any pre-set idling time YOU desire. Tell us the type of vehicle you have, the way YOU want it used, and we'll help you select the type of unit designed specifically for your needs.

Fuel Conservation Devices™ will not answer all of your fuel cost problems, but they will definitely eliminate one — ENGINES NOT BEING USED WILL DEFINITELY BE SHUT-OFF, THEY WON'T BE BURNING UP GAS AND OIL NEEDLESSLY.

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FCD™ DEVICES

Each Fuel Conservation Device™ manufactured by FCD Electronics, Incorporated is primarily designed to shutdown an engine when it's not being used.

There are four primary ways the devices do this:

1) By monitoring a door.
2) By monitoring the emergency brake.
3) By monitoring the "Park" position in an Automatic Transmission.
4) By combining any two of the three above and setting one to override the other.

Each monitoring system can be a positive shut-off or override re-set system.

As an example: Door Actuated Device:

a) Positive shut-off: Open the vehicle door. After a pre-set time, the device will shut-off the engine.

b) Override re-set system: Open and shut the vehicle door. This action starts the engine shut-off timer. If the door is opened and closed again before shut-off is activated, then the system will re-set and the engine will not shut-off.

An example of combining monitoring systems: Combining Door and "Park" position in an Automatic Transmission:

Set transmission in "park" position. Open and shut door leaving the vehicle with the engine on. After pre-set time, engine will shut-off. If return to the vehicle, get in, take transmision out of "park" before timer sequence shuts engine off, then the system will re-set and engine will not shut-off.

FCD Devices are small, solid-state component units each no larger than 3"x3"x2" (about the size of a voltage regulator). They are easily installed. All that's needed to install one is a power drill (to attach to fire-wall), a small wrench and a screwdriver. All parts used, as well as instructions on how to attach the device to the vehicle are included.

Each Fuel Conservation Device™ was designed for simplicity of operation, application and assembly, allowing ultimate conservation of fuel, oil and engine wear by positively assuring management that an engine is shut-off when it's not in use.

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FCD™ MODELS

SINGLE ACTUATED TYPES	
UNIT MODEL	**METHOD OF ACTUATION**
SM/DM 1000/1001	DOOR ACTUATED
SM/DM 2000/2001	EMERGENCY BRAKE ACTUATED
SM/DM 3000/3001	AUTOMATIC TRANSMISSION "PARK" POSITION ACTUATED

OPTIONS
(USING ANY ONE OF THE ABOVE METHODS OF ACTUATION)

1) POSITIVE SHUT-OFF OF ENGINE AFTER PRE-SET TIME DELAY.
2) OVERRIDE FEATURE.

COMBINED ACTUATED TYPES	
UNIT MODEL	**METHOD OF ACTUATION**
SM/DM 4000/4001	DOOR AND EMERGENCY BRAKE ACTUATED
SM/DM 5000/5001	AUTOMATIC TRANSMISSION "PARK" POSITION AND DOOR ACTUATED
SM/DM 6000/6001	EMERGENCY BRAKE AND AUTOMATIC TRANSMISSION "PARK" POSITION

THE 4000, 5000 AND 6000 ARE DESIGNED WITH ONE ACTUATION OVERRIDING THE OTHER, BUT BOTH ACTUATIONS MUST OCCUR BEFORE THE ENGINE SHUTS-OFF.

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